

## WHAT IS CLAIMED IS:

1. A plasma buildup method for building up an optical fiber preform (2), in which a buildup material is deposited on a primary preform (2) for building up by means of a plasma torch (3) fed with plasma-generating gas and in the presence of a silica-based material, and in which at least one reducing element is introduced upstream from said primary preform (2), the reducing element being suitable for reacting to induce reduction of the nitrogen oxides produced by interaction between nitrogen and oxygen in the presence of the plasma generated by the torch.
2. A method according to claim 1, in which at least one of the reducing elements is introduced in the gaseous state.
3. A method according to claim 2, in which said gaseous reducing element constitutes at least a portion of said plasma-generating gas.
4. A method according to claim 1, in which said gaseous reducing element is selected from the group comprising at least: hydrogen; ammonia; carbon monoxide; and light hydrocarbons, in particular methane, ethane, propane, and butane.
5. A method according to claim 1, in which at least one of the reducing elements is introduced in the solid state.
6. A method according to claim 5, in which said solid reducing element is selected from the group comprising at least: urea, and ammonium fluoride.
7. A method according to any one of claims 1 to 6, in which at least one of said reducing elements is

introduced into said plasma torch (3) upstream from an outlet nozzle (7).

5 8. A method according to claim 7, in which said reducing element is introduced into a central zone (10) of the plasma torch (3) in which said plasma-generating gas flows.

10 9. A method according to claim 8, in which said reducing element is introduced into said central zone (10) substantially simultaneously with said plasma-generating gas.

15 10. A method according to any one of claims 7 to 9, in which said reducing element is introduced to the periphery (11) of said central zone (10) of the plasma torch (3).

20 11. A method according to any one of claims 1 to 10, in which at least one of said reducing elements is introduced into said plasma torch (3) at an end of said outlet nozzle (7).

25 12. A method according to claim 11, in which said reducing element is introduced to the periphery of said end of the outlet nozzle (7) at at least one location.

30 13. A method according to any one of claims 1 to 12, in which at least one of said reducing elements is introduced into at least one location of an interaction zone (8) extending between said outlet nozzle (7) of the plasma torch (3) and said primary preform (2).

35 14. Plasma buildup apparatus (1) for building up an optical fiber preform (2), the apparatus comprising a plasma torch (3) fed with a plasma-generating gas by primary feed means (5) and arranged to enable a buildup

material to be deposited on a primary preform (2) for building up in the presence of a silica-based material, and in which secondary feed means (9) are arranged to introduce at least one reducing element upstream from said primary preform (2), the reducing element being suitable for reacting to induce reduction of the nitrogen oxides produced by interaction between nitrogen and oxygen in the presence of the plasma generated by the torch.

15. Apparatus according to claim 14, in which said secondary feed means (9) are coupled to said plasma torch (3) and arranged to introduce at least one of said reducing elements into the inside of said plasma torch, upstream from an outlet nozzle (7).

16. Apparatus according to claim 15, in which said secondary feed means (9) are arranged to introduce said reducing element into a central zone (10) of the plasma torch (3) in which said plasma-generating gas flows.

17. Apparatus according to any one of claims 14 to 16, in which said secondary feed means (9) are coupled to said plasma torch (3) and arranged to introduce said reducing element to the periphery (11) of said central zone (10) of the plasma torch (3).

18. Apparatus according to any one of claims 14 to 16, in which said secondary feed means (9) are coupled to said plasma torch (3) and arranged to introduce at least one of said reducing elements at an end of an outlet nozzle (7) of said plasma torch (3).

19. Apparatus according to claim 18, in which said secondary feed means (9) are coupled to said plasma torch (3) and arranged to introduce said reducing element to

the periphery of said end of the outlet nozzle (7), at at least one location.

20. Apparatus according to any one of claims 14 to 19,  
5 in which said secondary feed means (9) are coupled to said plasma torch (3) and arranged to introduce at least one of said reducing elements into at least one location of an interaction zone (8) extending between said outlet nozzle (7) of the plasma torch (3) and said primary  
10 preform (2).